# CDF Data Guard Briefing

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# CDF Goals

- return to data taking within 1 hour after a hard failure and CDF experts on site

- a form of the database remains operational for reading and permanent writing (data ultimately saved as part of production database) during long downtimes (several hours of planned switchover time acceptable).

# CDF Requirements

- Mixed Replication(Basic/Streams) and Data Guard environment
- No data loss during downtime – required
- All aspects supported by Oracle
- Do not increase sysadmin or DBA load unreasonably
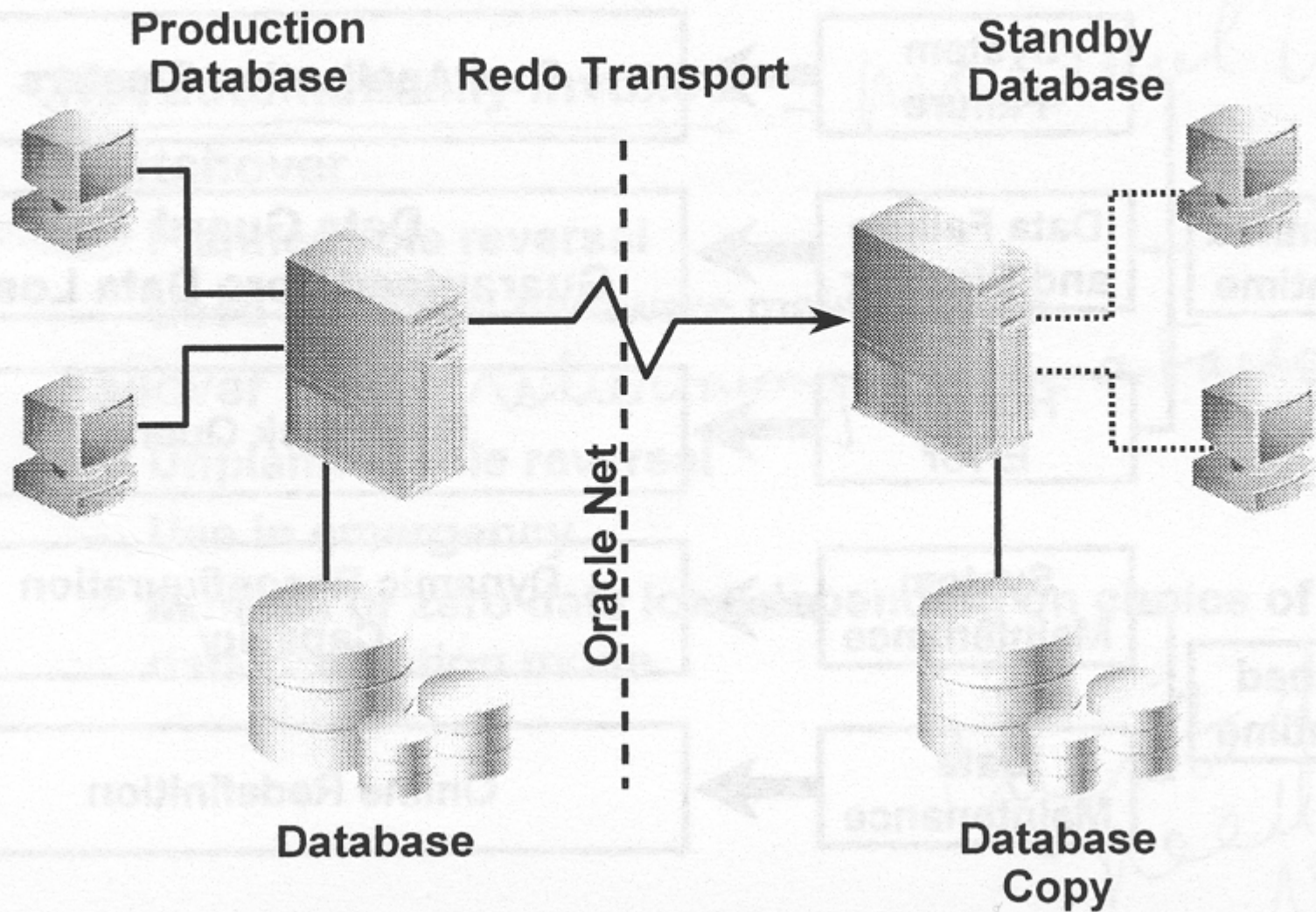- No more than 1 run lost (4 hours data=downtime) at hard failure

# CDF Requirements (con't)

- Uses linux platforms that will not need replacing before the end of Run II.
- In place in less than 6 months
- < $70K hardware
- Zero data loss at hard failure
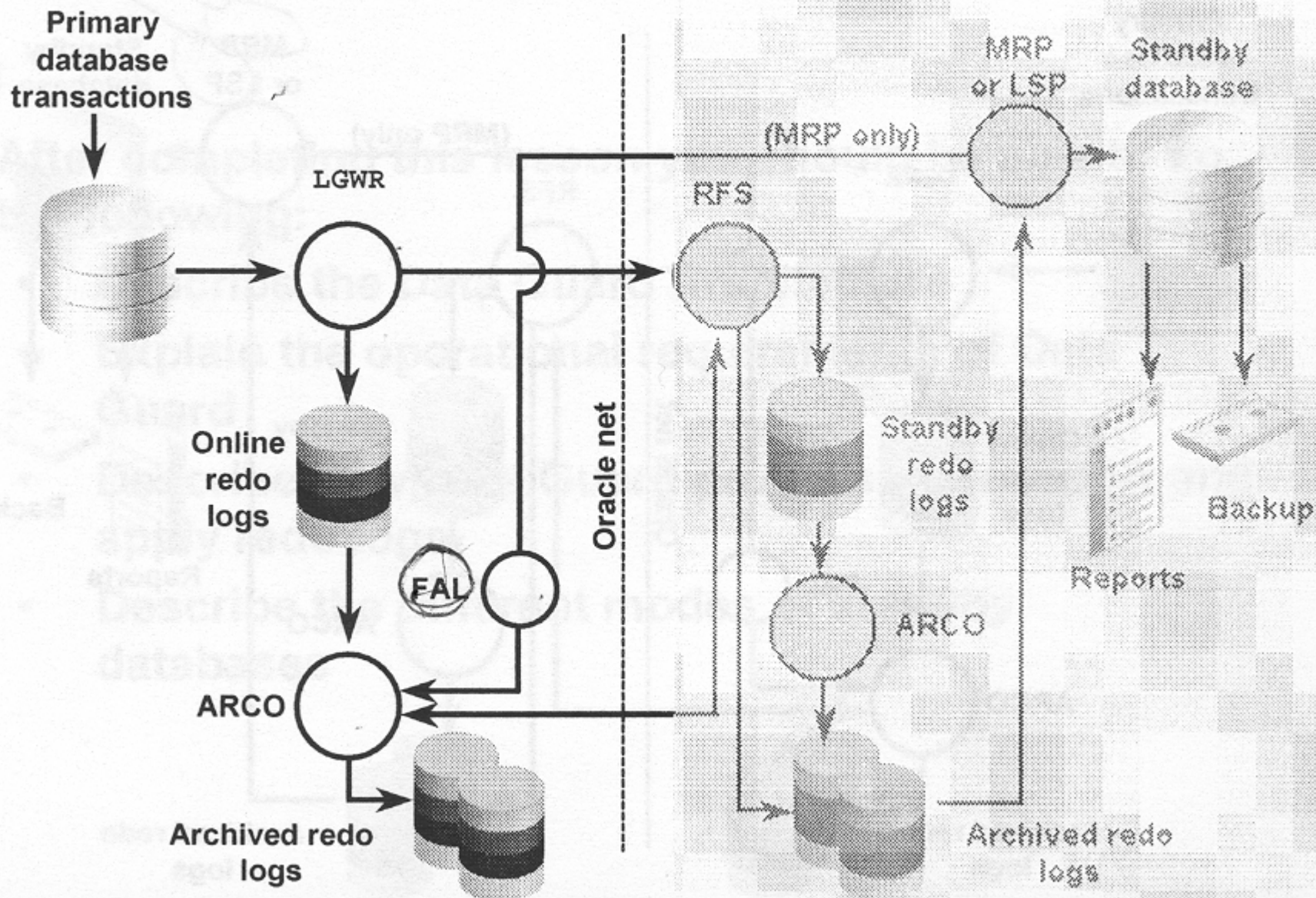- Transparent (no intervention) failover

# How is CDF Online protected now?

- Single Disk Failure
  - Mirroring
- Database Corruption  - human error
  - Rman (potential data loss)
- Database Loss – hardware failure,major power outage(ups failure)
  - Rman
- Secondary media for point-in-time –
  - exports on demand, not regular due to lack of disk availability

# What Is Oracle Data Guard?



**Production Database**

**Redo Transport**

**Standby Database**

Oracle Net

**Database**

**Database Copy**

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# Primary Database Flow

# Where does Data Guard fit ?

- Unplanned Downtime
  - System Failure
    - Real Application Clusters
  - Data Failure and Physical Disaster
    - Data Guard
  - Human Error
    - Flashback query, rman, export/import

# Types of Standby Databases

- There are two
  - Physical
    - Identical to the primary database block-for-block
    - Synchronized with the primary db thru redo apply
    - Managed Recovery State
  - Logical - not recommended with replication unsupported ddl
    - Shares the same schema definition
    - Synchronized with the primary db thru sql apply
    - Open Read-Write Mode (allows read to schemas being maintained by the redo apply and access to other db objects that are not maintained)
    - Unsupported Data Types Logical Database
      - Nclob, long, long raw, bfile, rowid and urowid, materialized view, and functional indexes

# Data Protection Modes

- Maximum Protection
  - 0 data loss
  - Halts production if it can't write to standby
  - recommended at least 2 machines 2 instances standbys
- Maximum Availability
  - 0 data loss
  - Does not halt production degrades to Max Performance to catch then back to Max Availability (Data Guard Broker)
  - recommended at least 2 machines 2 instances tandbys
- Maximum Performance
  - potential data loss
  - Best performance on production
  - Only 1 standby required

# Data Guard Switchover & Failover

- Neither automatically invoked, both require databases to bounce
- Switchover
  - Planned role reversal for testing
    - Read data to see if in case of disaster works
  - Used for o/s or hardware maintenance
- Failover
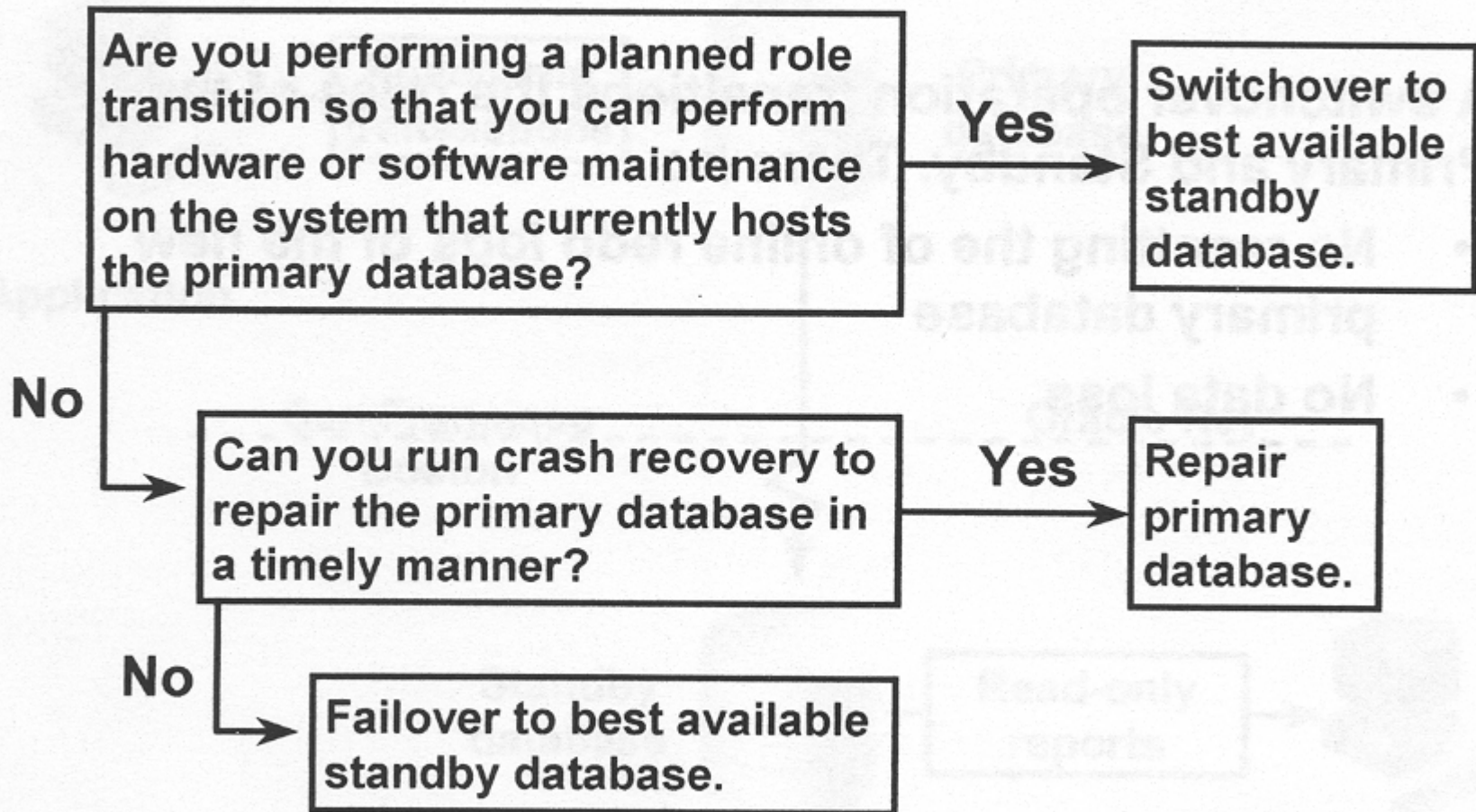  - Unplanned role reversal (disaster)

# Replication in the mix

- "Replication serves two different business purposes and attempts to combine these features by using common system resources, may lead you/ the customer to unchartered/untested waters." per Oracle

# Streams in the mix

- "Generally speaking, we support a Data Guard configuration involving a primary database (A) and a physical standby database (B), along with a Streams configuration involving the same primary database (A) but a different replicated database (C). The usual Data Guard switchovers/failovers are expected to work, altho' some manual intervention may be required to re-establish the Streams configuration after a switchover/failover."

# Role Transition Decision Tree

Are you performing a planned role transition so that you can perform hardware or software maintenance on the system that currently hosts the primary database?

**Yes** → Switchover to best available standby database.

**No** →

Can you run crash recovery to repair the primary database in a timely manner?

**Yes** → Repair primary database.

**No** → Failover to best available standby database.

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# Costs

- Hardware
  - Retrofit old offline machine investigated
    - Not feasible,less expensive to purchase E4500 vs retrofit
  - Likely to get a refurbished E4500 and  disks
    - http://www-css.fnal.gov/dsg/internal/briefings_and_projects/planning/Data_Guard/

- High implementation, testing and maintenance costs(human) including interaction with replicated boxes

# Why Data Guard?

- Continue service through a disaster with manual intervention
- Data Protection against corruption and data loss dependent on Protection Mode
- Off-load rman to your Standby
- Get more work on production system
  - Non-interruptive work is limited to additional cpu and adding disks
  - Does not include patches on oracle or o/s

# Why Not Data Guard?

- Manual Intervention to failover in case of disaster
- Manual Intervention to reestablish replication
- Mix of Data Guard and Basic Replication not recommended
- Mix of Data Guard &Streams is unchartered water
- Regular testing of switchover to test standby
- Client and Application Interruption
- Additional Hardware – for 0 data loss +2
- New untested recovery scenario
  - People using backtrack product from BMC
  - Experience with RMAN not consistent

# Does this meet our requirements?

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# Other options

- Do Nothing
  - take the downtime and recover database
- Another E4500 machine – $10K (similar to cdfofline)
- Pre buffer data
  - Define disk storage and load data after database recovered
- Use some other instance
  - Temporary solution to collect data then transfer over
- Investigate improving our recovery strategies
- Standby Database
  - Oracle 8 feature vs 9 simpler implementation